

TOSHIBA

DISK PRODUCTS DIVISION

SD-W1111

DVD-RAM DRIVE

PRODUCT SPECIFICATION

JUNE 1999
REV. 1.0

Specifications are subject to change without notice

DOCUMENT NUMBER
12043

Matters to be attended to:

This drive adopts RPC-II for its "Standard Specification Model".

This DVD-RAM Drive adopts RPC-II, the Phase II System of RPC (Regional Playback Control) for "Standard Specification Model", on the basis of a contract with the CSS (Contents Scramble System) organization. (all of our former DVD-RAM Drives adopted RPC-I, the Phase I System.)

The CSS rule requires that all the products not only DVD-RAM Drives but also PC systems installing DVD-RAM Drives sold from Jan.1, 2000 need to support RPC-II described above.

To playback a DVD-Movie Software with the Regional Code specified by using a DVD-RAM Drive with RPC-II adopted, either the hardware or software used as applications on PC system side is also required to meet RPC-II.

Namely, in the status that a hardware or a software for a DVD-Movie Playback Application planned to use in a PC does not support RPC-II, if the "RPC-II (Standard Specification) Drive" is used in combination, DVD-Movie Softwares with the Regional Code specified (most of DVD-Movie Softwares currently available on the market) cannot be reproduced. So, in such a case, "RPC-I Specifications Supported Model" must be purchased for a while.

However, all the drive manufacturers must obey to the deadline specified by the CSS rule saying; all DVD-RAM Drives have to implement Phase II from Jan.1, 2000. So we recommend that you will change your DVD-Movie Playback Hardware or Software to those applicable to the PRC-II as soon as possible and investigate to combine your system with the RPC-II Specification Drives.

Since we determine the drives are of RPC-I or RPC-II when manufacturing at factory and ship, the specification change after shipping is not available in principle. Especially, changing the RPC-II specification drive to the RPC-I is prohibited by the CSS rule.

In the combination of the drive and PC system with RPC-II supported, as far as the Regional Code of a DVD-Movie Software and the code memorized in the RPC-II Specification Drive coincides, the Movie Software is allowed to carry out.

In the RPC-II Specification Drive, the region change by an end user is permitted up to 5 times in total including the initial region set. After change to the fifth region is carried out, the Drive enters Parm State ("no change allowed" status).

The drive with Parm State is permitted up to 4 times of "reinitialization" by a drive manufacturer or a specific service center authorized by the CSS. Since it is considered that the reinitialization is carried out after the completion of the region confirmation through test items in the PC manufacturer's manufacturing line or the completion of drive repair, etc., the number of reinitialization times may vary from 0 (no reinitialization available) to 4 times. So, we recommend that not to disclose the reinitialization process to end users but only to inform the number of region setting times as "end user's direct region setting is available up to 5 times in total."

Precaution

This equipment (an optical disc drive) handled under the conditions out of product specifications may cause injury, heat generation, trouble, erroneous operation and performance degradation, so, care will be necessary, and proper handling according to the precautions shown below will be required. In case of mishandling without keeping the cautions, safety, reliability and performance of the product are not guaranteed. For systems using this equipment, please note it above mentioned on manuals etc. to understand the users completely.

Cautions

- (1) Don't loosen screws except persons trained with specified instructions. The reliability, safety and performance specified in this specification can not be satisfied.
- (2) Don't modify this equipment. The reliability, safety and performance specified in this specification can not be satisfied.
- (3) Don't insert any objects or cartridge other than specified from the cartridge insertion slot. It may cause trouble or erroneous operation.
- (4) Don't give excessive vibration and shock this equipment. It may cause trouble or erroneous operation.
- (5) Toshiba Corporation makes no warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. This product may sustain damages which may cause errors and failures. The causes are not confined to what are mentioned or implied in this document. Therefore, the possibilities of error and failure should be taken into consideration when furnishing systems should be protected by such means as system backup and mirroring disk subsystem, especially when this product is used for systems as medical appliances. Toshiba Corporation shall not be liable for incidental or consequential losses or damages to tangible property, injury or death of person in connection with the errors and failures which may occur when furnishing, operating or using this product
- (6) When a disc cannot be ejected because of some troubles, etc., turn off the power for this equipment and eject the disc using the emergency eject mechanism after passing more than 1 minute. When the emergency eject is carried out while the power is on or immediately after the power off, the disc may be ejected in a rotating status. Toshiba Corporation does not assure if the disc is damaged by this.

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1. Scope

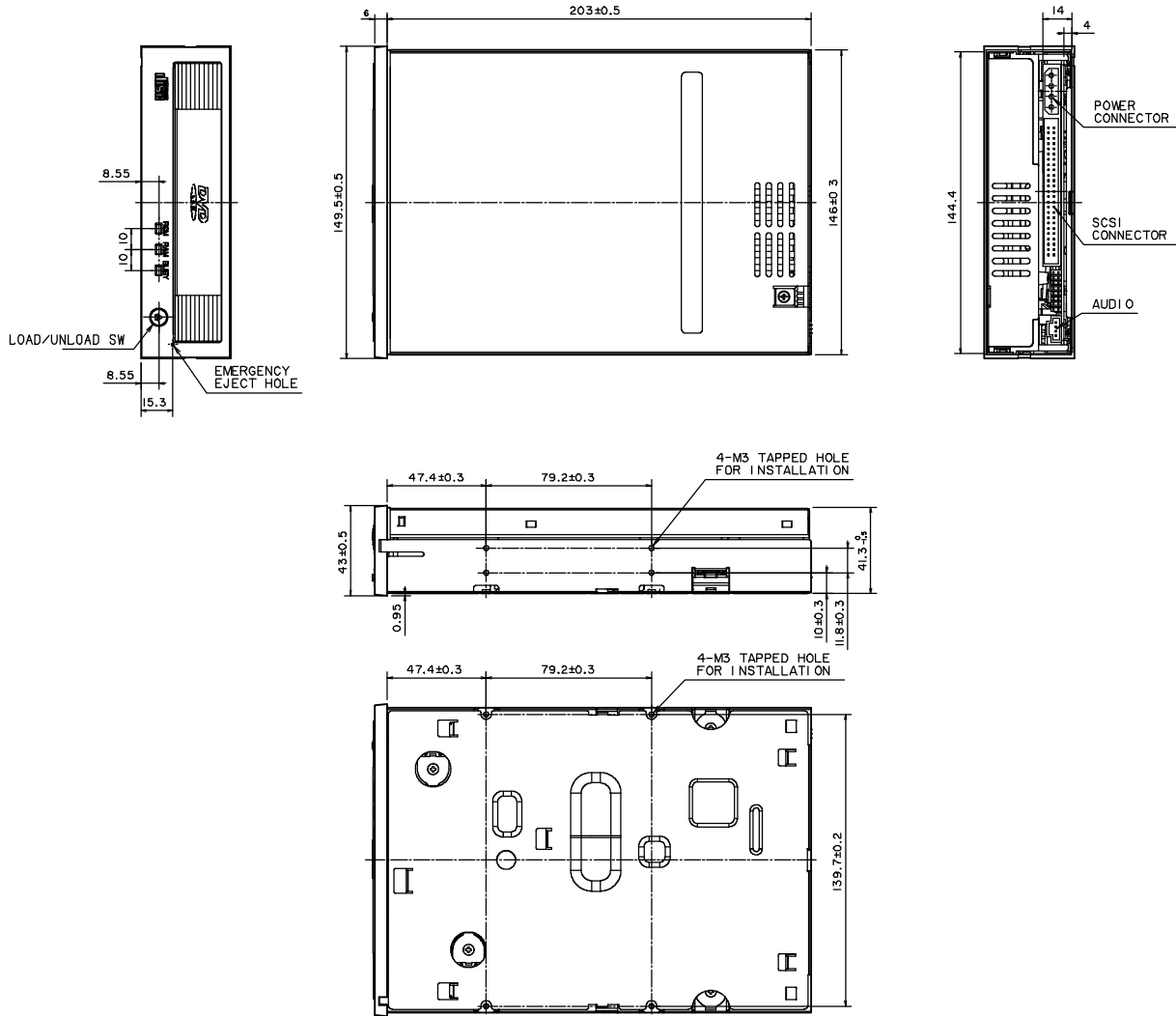
The specification is applied to DVD-RAM drive SD-W1111.

2. Features

- (1) 2.6 GBytes capacity on one side of a 120 mm disc
 - Using 650 nm short-wavelength laser, 0.74 μm single spiral land and groove tracking and Z-CLV system, realizes the memory of 2.6 GBytes (decimal) on one side of a 120 mm disc.
- (2) High data recording rate by over-writing system
 - Phase change recording technology enables to write data directory into the media without waiting for pre-erasing (one-path direct over-writing system).
- (3) Playback interchangeability for CD-ROM and DVD-ROM discs
 - Playback a disc either for CD-ROM, CD audio or DVD-ROM.
- (4) High-speed data transfer rate
 - Possible to record and playback MPEG2 compressed motion picture (MP@ML) in a real time.
 - Owing to the read/write cache, improves the data throughput marvelously.
- (5) Low power consumption of 6.7W (typ.) using +5V single power supply
 - Owing to the low power consumption design to operate using +5V single power supply, no exclusive fan is required.
- (6) Dust prevention structure
 - Original sealing structure provides dust prevention features.
- (7) Easy contact and operation
 - Employs the SCSI interface that is easy to connect with various platform .
 - Possible to install vertically as well as horizontally.
- (8) High reliability
 - MTBF 100,000H (under specified conditions)
 - Powerful error correction ability by employing the erasure correction system using the ECC block which is same as the DVD-ROM system.

3. External views and dimensions

External views: 146.0 x 203.0 x 41.3 (mm) (W x D x H) (Except for front bezel)



4. Basic specifications

- 5.25" half height form factor
- Applicable discs(1GB = 2³⁰ Byte, 1MB = 2²⁰ Byte 1KB = 2¹⁰ Byte)
 - 1) DVD-RAM *¹

DVD Specifications for Rewritable Disc Part 1 Version 1.0

2.42 GBytes*² x 1 (Cartridge with a single-sided disc provided / No cartridge) *³

2.42 GBytes x 2 (Cartridge with a double-sided disc is provided / No cartridge)
 - 2) DVD-ROM

DVD Specifications for Read-Only Disc Part 1 Version 1.0

4.38 GBytes x 1 or 2 Single-layer disc

7.96 GBytes x 1 or 2 Dual-layer disc
 - 3) DVD-R (Read only) *⁴
 - 4) CD-ROM

Red-book, Yellow-Book, CD-ROM XA, CD-I Bridge (Photo-CD, Video-CD)

CD-I*⁵, CD-I Ready, CD-G, CD-TEXT, Multi-session (Photo CD Disc, CD-Extra)
 - 5) CD-DA playback to Analog audio output
 - 6) CD-R (Read only) *⁴
 - 7) CD-RW (Read only) *⁴
 - *1: Toshiba designate a recommend disc the performance of which has been checked by this drive.
 - *2: Formatted user capacity: 2.32GB
 - *3: When using a disc without using a cartridge, limitation on function features may occur.
 - *4: Depending on the feature of a recording unit that records data, playback function may not be guaranteed.
 - *5: Need special hardware and software for playback.
- Disc diameter 120 mm/80mm (CD single, DVD-ROM single)
- Rotational speed
 - 1,028 – 2,400 rpm (DVD-RAM)
 - 1,200 – 2,800 rpm (DVD-ROM Single-layer)
 - 1,300 – 3,000 rpm (DVD-ROM Dual-layer and DVD-R)
 - 3,516 rpm (CD-ROM)
- Transfer rate (sustained) (1KB = 2¹⁰ Byte=1,024 Byte)
 - 1,350 KB/s (DVD-RAM)
 - 2,700 KB/s (DVD-ROM, DVD-R)
 - 990 – 2,400 KB/s (CD-ROM, CAV, 6.6 to 16X)
- Host I/F
 - SCSI
 - Command set SFF8090 Ver. 2 Rev 0.95
 - ANSI X3T9.2 Rev10L
 - Transfer rate (burst) 5MB/s max. (at asynchronous transfer)
 - 10MB/s max. (at synchronous transfer)
 - Single ended driver

- Average seek time (Operating time of SEEK command)

DVD-RAM	120 ms (typ.)
DVD-ROM	210 ms (typ.)
CD-ROM	140 ms (typ.)
 - Average access time

DVD-RAM playback	180 ms* ¹ (typ.)
DVD-ROM	260 ms* ¹ (typ.)
CD-ROM	170 ms* ² (typ.)

*1 Operation time when playing back 1ECC block by READ command
*2 Operation time when playing back 1 sector by READ command
 - Start time (average): START UNIT command execution time (w/o loading tray)

DVD-RAM	15.0 s*
DVD-ROM (Single-layer)	7.0 s
DVD-ROM (Dual-layer)	12.0 s
CD-ROM	7.0 s

* Start time may be longer depending on the defect number registered
 - Restart time

	1.0 s (from idle to active)
	2.0 s (from sleep to standby)
 - I/O terminal

I/F connector	Applicable to 2.54 mm pitch flat cable.
Mode select header	
CD audio connector	1 Vrms, Unbalanced
Power supply connector	
 - Physical recording size(DVD-RAM) 32 KBytes (ECC block unit)
 - Logical sector size 2 KBytes
 - Data buffer 2 MBytes
 - Initialize time Less than 1.0s
- (Time until the unit responds to the command after power turns on.)

5. Power supply specifications

5.1 Input power supply

+5V \pm 5%, peak current 3A (Max. 2 sec., at spindle motor ON/OFF)

Note: Power supply current is usually 1.4A. But at a spin-up time the current increase to 3.0A. If the power supply cable that is long and thin, power supply voltage is drop and out of the operational condition of this drive. Please use a short and thick power supply cable.

Note: The voltage drop with the power supply cable is approximately as follows.

Wire	Resistance (Ω /km)	Voltage drop (V)* at 1m wire length and 3A current
AWG22 (Twist wire)	57.4	0.344
AWG18 (Twist wire)	23.7	0.142
AWG22 (Single wire)	56.3	0.338
AWG18 (Single wire)	22.2	0.133

* The drop voltage in the both of the ground line and the power supply line

* This value changes according to the electric wire maker and the use temperature.

5.2 Power consumption

Average Less than 6.7W

Stand-by period: Less than 6.0W

Seek period: Less than 11.0W

Sleep period: Less than 1.0W

5.3 Allowable ripple voltage

Less than 100 mVp-p (includes spike noise)

6. Mechanical specifications

6.1 Dimensions

Refer to the drawing attached. (3. External views and dimensions)

6.2 Mass

1.14kg (Net ,include front bezel)

6.3 Disc loading

Auto-loading tray system (Bare disc, cartridge disc)

Tray load/unload mechanism

- 1) Load/Unload operation by the load/unload switch
- 2) Load operation by pressing the tray.
- 3) Load/Unload operation by the command.
- 4) Emergency eject function

6.4 Optical head auto-lock mechanism

To protect the optical head while transporting the drive, the optical head auto-lock function is provided.

Be sure to avoid transport with a disc loaded.

According to the steps described below, the optical head auto-lock mechanism can be functioned.

- Eject a disc.
- Pull-in the tray inside the drive.
- After "BUSY" lamp turns off, the auto-lock function completes.

When transporting, transport the drive after performing the steps above and turning off the power.

7. Reliability specifications

7.1 Error rate

DVD-RAM

Read error rate	less than 10^{-15} (Byte error rate)
Seek error rate	less than 10^{-6} error/seek

DVD-ROM

Read error rate	less than 10^{-15} (Byte error rate)
Seek error rate	less than 10^{-6} error/seek

CD-ROM

Read error rate (Mode 1)	less than 10^{-15} (Byte error rate)
Read error rate (Mode 2)	less than 10^{-12} (Byte error rate)
Seek error rate	less than 10^{-6} error/seek

Allows five times internal retry operations.

7.2 Life

Either of shorter life of 5 years or 15,000 POH

Loading mechanism 10,000 times

MTBF 100,000 H

Setting conditions:

Power on period	5,436 H/year (17 H/day)
Power on time	313 times/year
Access times	600,000 times/year
Using duty	Playback : 20%
	Recording : 2%

8. Environmental specifications

The drive might satisfy the basic specification over the following conditions.

8.1 Temperature

Operating	5 to 50 °C (Temperature variation gradient: 10°C/h)
Storing	-10 to 60 °C (Temperature variation gradient: 20°C/h, except for media)
Transporting (with packing)	-40 to 65 °C (Temperature variation gradient 20°C/h, except for media)

8.2 Relative humidity

Operating	8 to 80% RH
Storing	5 to 95% RH
Transporting (with packing)	5 to 95% RH
(Temperature variation gradient: 10% /h, absolute humidity: 30 gm ³) * No dew condensation	

8.3 Vibration(5 to 300 Hz)

Operating	2.45 m/s ² (0.25G) _{0-p}
Non-operating	9.8 m/s ² (1.0G) _{0-p}
Transporting (with packing)	9.8 m/s ² (1.0G) _{0-p}

8.4 Shock(Half sine wave 11 msec., interval 2 sec., 5 cycle)

Operating	14.7 m/s ² (1.5G) _{0-p}
Non-operating (disc not loaded)	490 m/s ² (50G) _{0-p}

8.5 Altitude

Operating	0 to 3,000 m
Transporting (with packing)	0 to 12,000m

8.6 Static electricity

Specification	IEC801-2
Operation	6 KV or lower
Damage	15 KV or upper

8.7 Acoustic noise

45 dB (Max.)

Measurement conditions:

- 1m away from the drive
- JIS A correction
- Standard front bezel attached

8.8 Applicable regulations

- (1) UL1950 3rd
- (2) CSA C22.2 No. 950 3rd
- (3) TUV (EN60950/EN60825-1)
- (4) DHHS 21 CFR Sub-Chapter J
- (5) CE standard

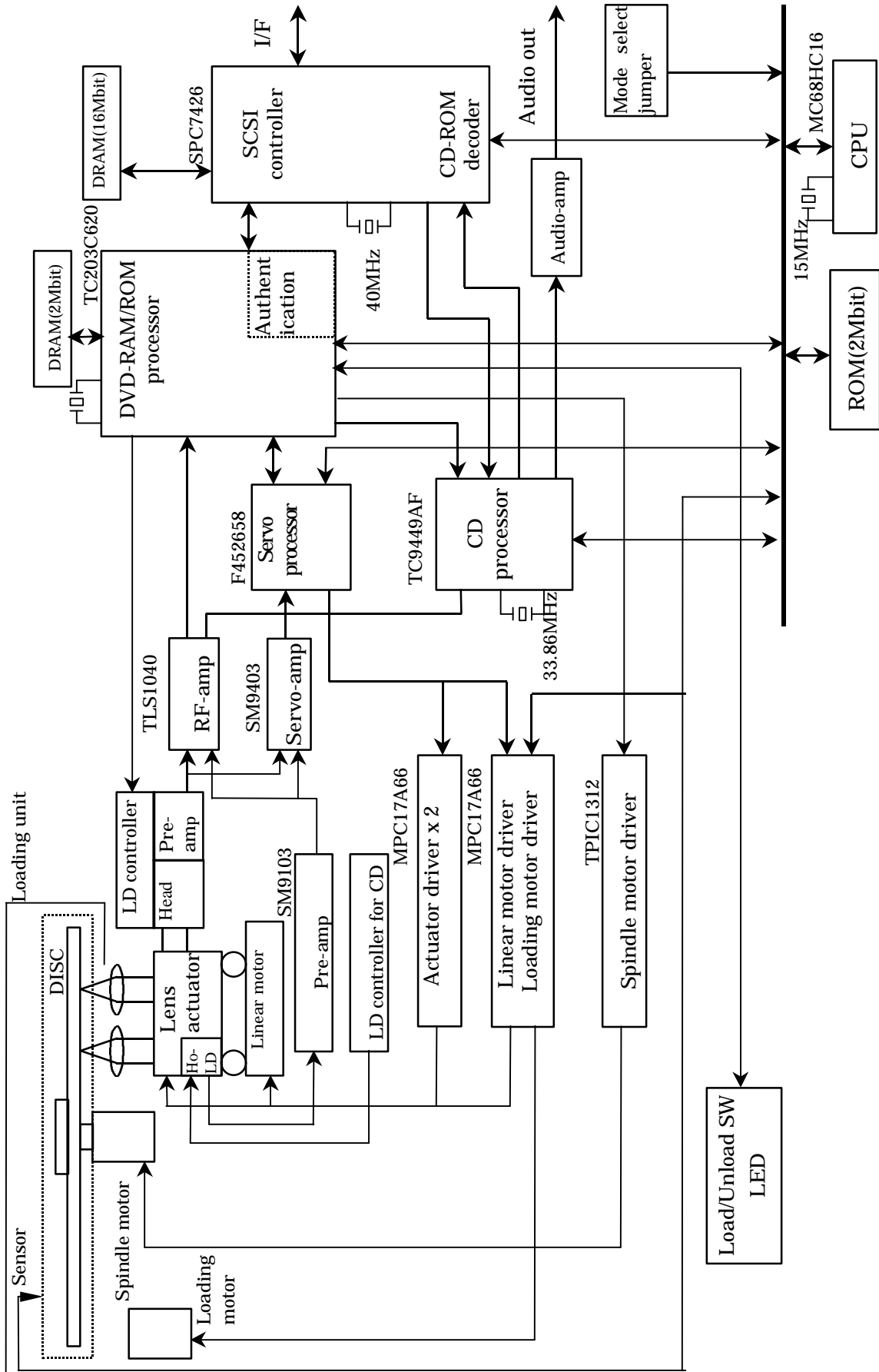
EN50081-1	: 1992
EN55022+A1	: 1994 class B
EN50082-1	: 1997
EN61000-4-2	: 1995
EN61000-4-3	: 1996
ENV50204	: 1995
EN61000-4-4	: 1995
EN61000-4-5	: 1995

EN61000-4-6 : 1996

EN61000-4-8 : 1993

EN61000-4-11 : 1994

9. Block diagram



OD-A017-02

TOSHIBA DVD-RAM SD-W1111

'99/06/26 Version 1.0

10. Mounting

10.1 Mounting

Mount the drive using four M3 tapping holes bottom and two M3 tapping holes on each side. The following shows an example mounting on a personal computer or a sub system.

146

146.3

Flatness deviation under 0.5mm

Use screws of which length inside the drive should be more than 2.5mm and less than 3.5 mm from the drive frame surface.

Keep this gap less than 0.5mm .

Before fixing

After fixing

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Product Specification

OD-A017-02

TOSHIBA DVD-RAM SD-W1111

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10.2 Mounting direction

Install direction Horizontal or vertical installation

(When using an 80mm disc, vertical direction installation is not allowed.)

Allowable slants (Refer to the drawing.) Left/right directions: Within $\pm 15^\circ$.

(When installing vertically, the allowable slants toward the top plate bottom should be 0° .)

Front/rear directions: Within 10°

15° max
15° max

15° max

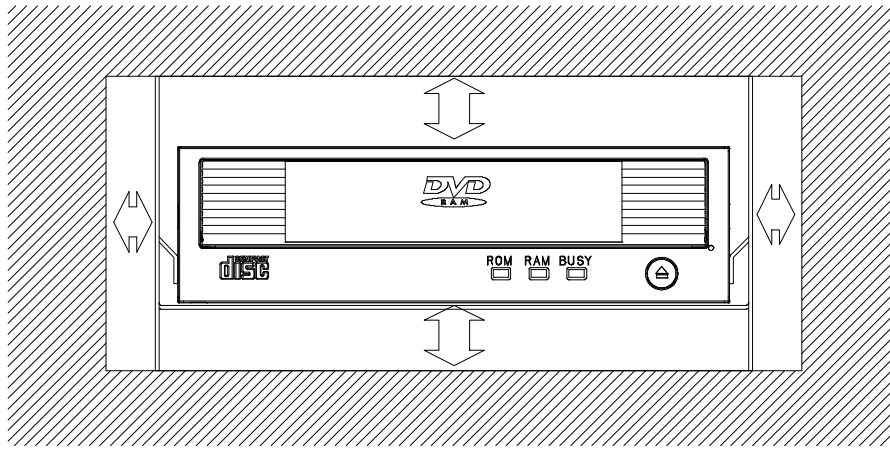
10° max
10° max

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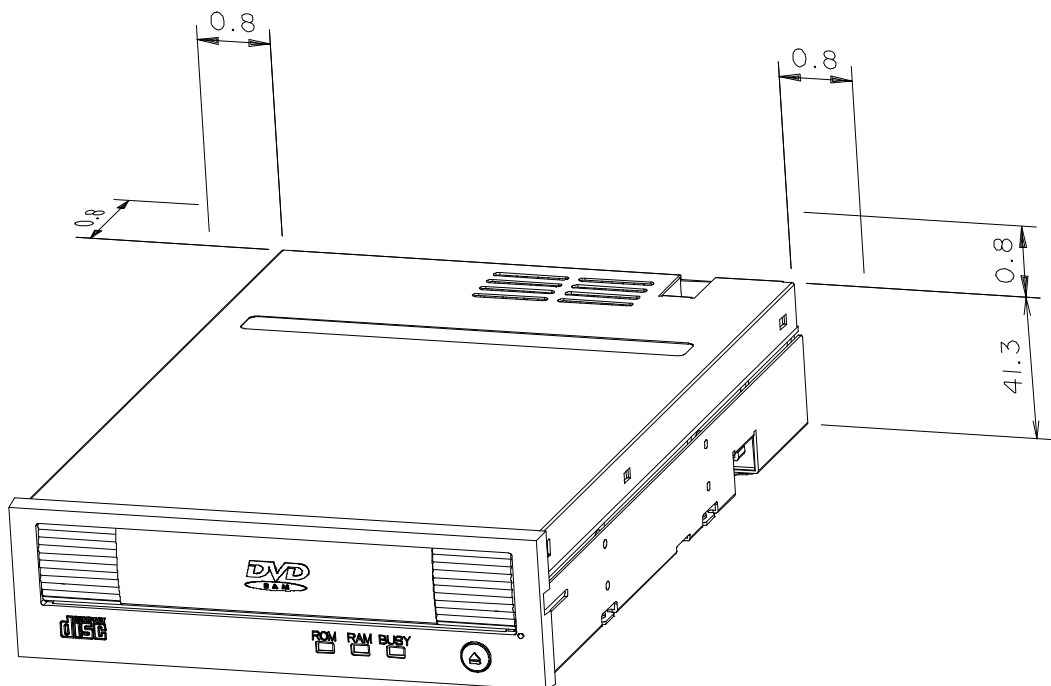
Product Specification

10.3 Notes on mounting

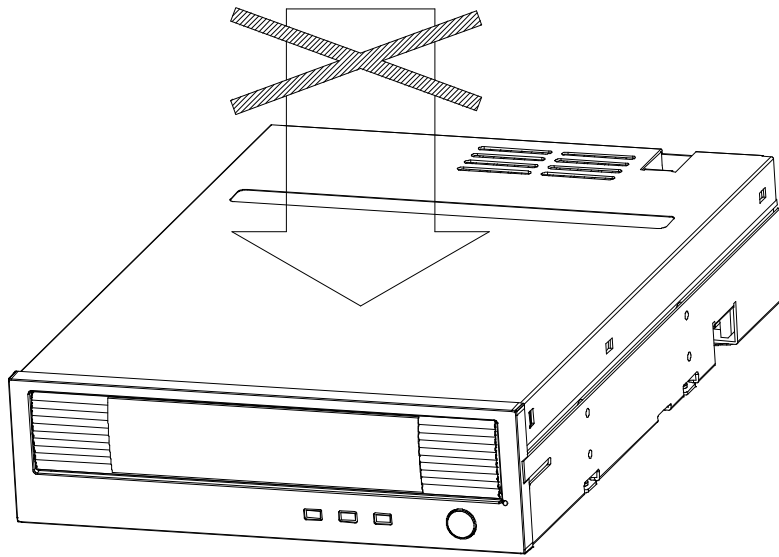
- Keep more than 5mm clearance to circulate an adequate amount of air by convection around the drive and mounting metal parts.



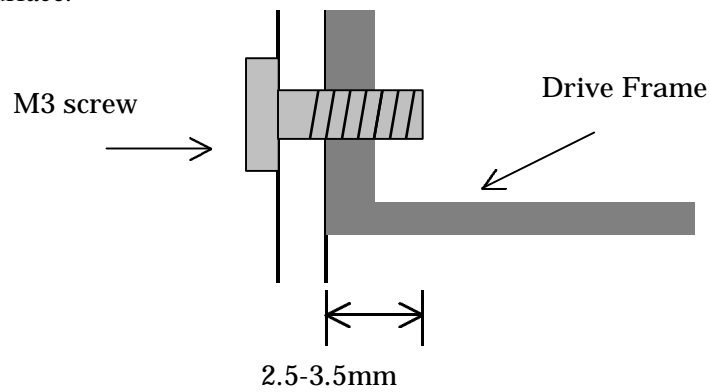
- Keep more than 0.8mm clearance around the top cover in order to secure absorbing shock and vibration.



- Do not apply force (under 1.5N : 150gf) caving in the top plate.



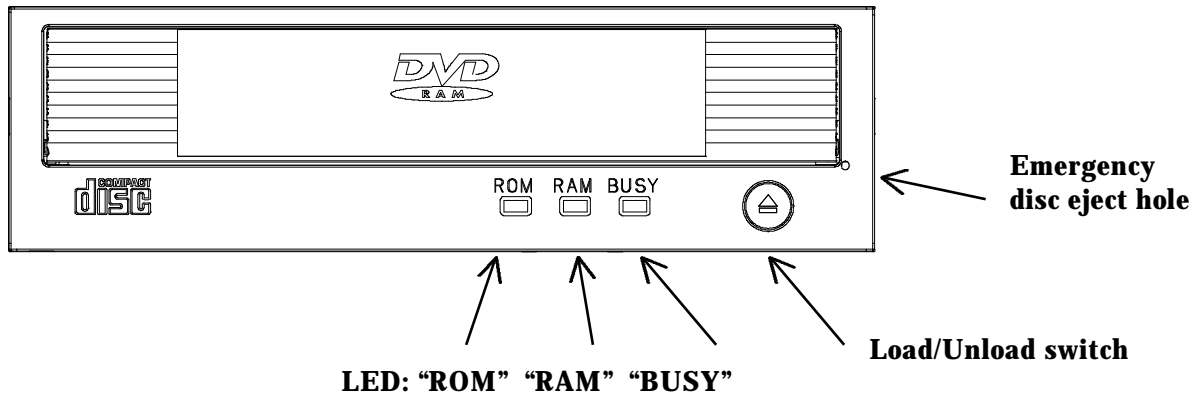
- Use screws of which length inside the drive should be more than 2.5mm and less than 3.5 mm from the drive frame surface.



11. Front bezel

11.1 Standard Bezel

The front view of the drive with a standard bezel



- **Load/Unload switch:**

Push when ejecting/pulling-in the tray

- **Emergency disc eject hole:**

When ejecting a disc with power turned off, insert an exclusive tool to eject a disc. (Refer to 15.3)

- **LED:**

“BUSY” (orange): Lights when the drive operates.

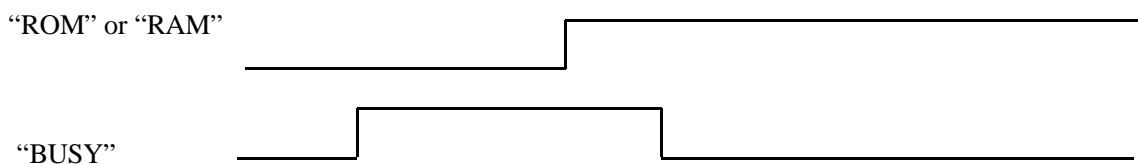
“RAM” (green): Lights when DVD-RAM disc is loaded.

“ROM” (green): Lights when either of DVD-ROM, DVD-R or CD-** is loaded.

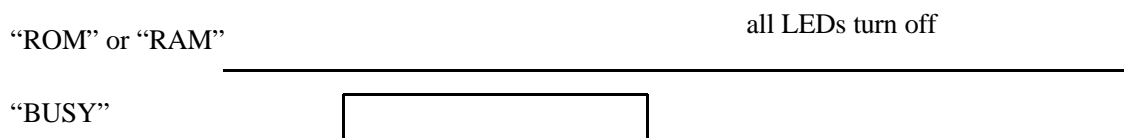
11.2 LED lighting

Closing the tray, “BUSY” LED lights and the drive status becomes as follows;

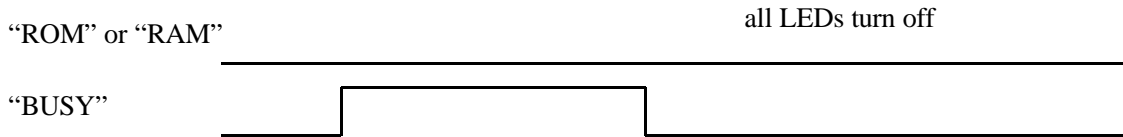
(1) A disc is loaded and the drive status becomes “Ready”, “RAM” LED or “ROM” LED turns on according to the disc type and “BUSY” LED turns off.



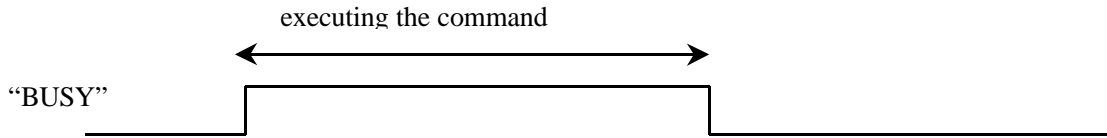
(2) A disc is loaded but the drive status doesn't become “Ready”, all LEDs turn off.



(3) A disc is not loaded, all LED's turn off.



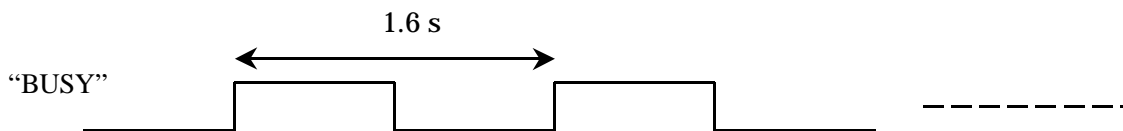
(4) While executing following command, "BUSY" LED turns on.



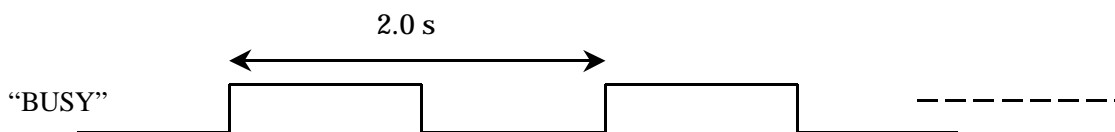
Command

REASIGN	READ
WRITE	SEEK
WRITE & VERIFY	VERIFY
SEND DIAGNOSTIC	READ HEADER
SET READ AHEAD	GET PERFORMANCE
START / STOP UNIT	

(5) While executing FORMAT command, "RAM" LED turns on and "BUSY" LED blinks on about 1.6sec cycle.

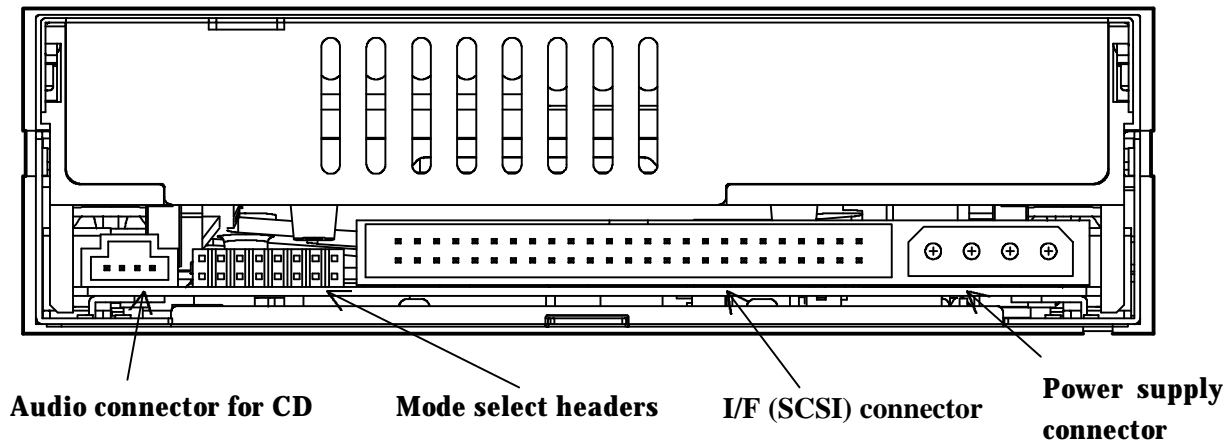


(6) While playing a CD audio track, "ROM" LED turns on and "BUSY" LED blinks on about 2.0sec cycle.



12. Rear View and Connectors

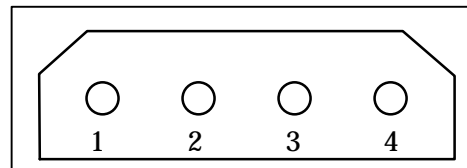
The rear view of the drive



- Power supply connector (4 pin): DC power supply is to be connected.
- I/F (SCSI) connector (50 pin): SCSI connector is to be connected.
- Modes select headers (2 x 8 bits): Used to perform function settings.
- Audio connector for CD (4 pin): CD audio outputs.

12.1 Power supply connector

Pin No.	Connection
1	+5V
2	GND
3	GND
4	NC



Use the plug of IRISO ELECTRONICS P/N9047b-54Z12-GT or equivalent one.

12.2 I/F connector (SCSI connector)

12.2.1 Pin No. table of connector terminal

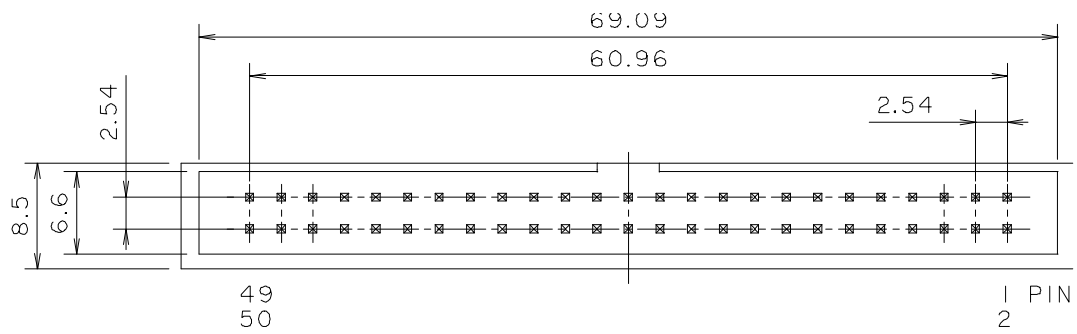
Pin	Signal	Pin	Signal
1	Ground	2	DB0
3	Ground	4	DB1
5	Ground	6	DB2
7	Ground	8	DB3
9	Ground	10	DB4
11	Ground	12	DB5
13	Ground	14	DB6
15	Ground	16	DB7
17	Ground	18	DBP
19	Ground	20	Ground
21	Ground	22	Ground
23	Ground	24	Ground
25	Open	26	TERMPWR
27	Ground	28	Ground
29	Ground	30	Ground
31	Ground	32	ATN
33	Ground	34	Ground
35	Ground	36	BSY
37	Ground	38	ACK
39	Ground	40	RST
41	Ground	42	MSG
43	Ground	44	SEL
45	Ground	46	C/D
47	Ground	48	REQ
49	Ground	50	I/O

*Notes 1) the low level of all signals returns TRUE.

Use Hirose Electronics Co. HIF 3BB-50DA-2.54R, Molex 5320-50AT2 or equivalent one for the connector on cable side.

The voltage is added on the TERMPWER signal from the internal side of a drive. The maximum power supply current from internal side of a drive is 1.1A. If the current exceeds this level, the internal current limiter operates to stop the voltage addition. After the cause of excess current is removed, the signal returns to the original status.

12.2.2 External view diagram



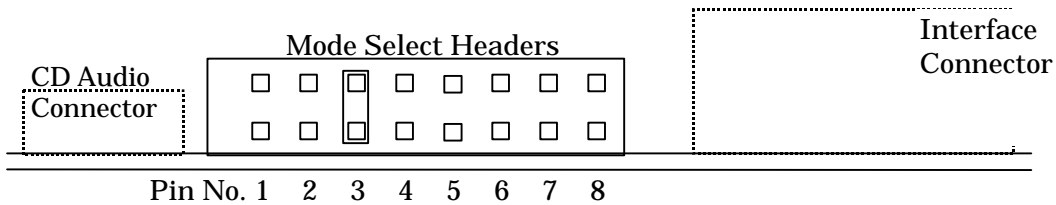
12.2.3 Signal interface

Type	50 core flat cable or 25 couple stranded wire cable
Inductor size	more than AWG28
Characteristic impedance	100ohm \pm 10%
Maximum cable length	3.0m

12.3 Mode select headers functions

By inserting the jumper wire to the mode select headers , each kind of operation mode is made.

Mode select headers:2.54-mm pitch



Pin No.	Functions	Setting at shipping
1	SCSI ID1 (LSB)	Open
2	SCSI ID2	Open
3	SCSI ID4 (MSB)	Short
4	PARITY CHECK	Open
5	VERIFY	Open
6	ONE LUN/TWO LUN	Open
7	Reserved	Open
8	Termination	Open

12.3.1 SCSI ID setting

Pin 1 ID1	Pin 2 ID2	Pin 3 ID3	Pin 4 ID4
Open	Open	Open	0
Short	Open	Open	1
Open	Short	Open	2
Short	Short	Open	3
Open	Open	Short	4
Short	Open	Short	5
Open	Short	Short	6
Short	Short	Short	7

12.3.2 Parity check setting

Pin 4	Functions
Open	Data parity check enable.
Short	Data parity check disable.

12.3.3 VERIFY setting

- Verify setting function is effective to WRITE command only.
- The RAM disc re-inserted into TYPE-2 case is verified ,even if the pin5 is shorted.

Pin 5	Functions
Open	The drive verifies the written data, on the media after the write operation. Writing speed is lower, but data reliability is better.
Short	The drive does not verify the written data after the write operation. The drive cannot detect the defect on the media, but Writing speed is higher.

12.3.4 ONE LUN/TWO LUN setting

Pin 6	Function
Open	The drive operates in ONE LUN mode.
Short	The drive operates in TWO LUN mode.

ONE LUN mode: The drive operates in one LUN (Logical Unit Number) for all discs to which SF8090 Ver. 0.2 supports.

TWO LUN mode: The drive operates in the following two LUNs.

LUN = 0: CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-R disc (Device type = 5)

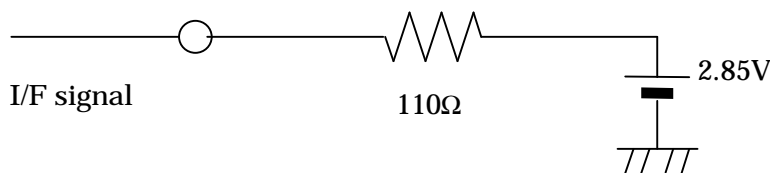
LUN = 1: DVD-RAM disc (Device type = 7)

(LUN = 0/1 The selection of either 0 or 1 is switched according to a disc inserted.)

12.3.5 Termination setting

Pin 8	Function
Open	Termination disable.
Short	Termination enable.

When the termination enabled, the following circuit is connected to each SCSI signal.



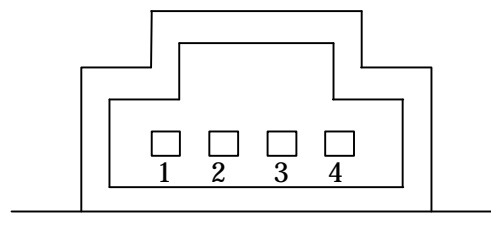
12.3.6 Change of setting

The setting change should be carried out after turning off the power.

12.4 Audio Connector

When playing back a CD audio disc, the terminal develops the audio signal.

Pin No.	Signal
1	R
2	GND
3	GND
4	L



Connection should be done using a connector, part number:103959-3, manufactured by AMP or equivalent one.

13. Host interface specification

13.1 Applicable standard

SCSI

Command set SFF8090 Ver. 2 Rev 0.95
 ANSI X3T9.2 Rev 10L

13.2 SCSI command set

Code (Hex.)	Command
00	TEST UNIT READY
01	REZERO UNIT
03	REQUEST SENSE
04	FORMAT UNIT
07	REASSIGN BLOCKS
12	INQUIRY
15	MODE SELECT (6)
16	RESERVE (6)
17	RELEASE (6)
1A	MODE SENSE (6)
1B	START STOP UNIT
1D	SEND DIAGNOSTIC
1E	PREVENT/ALLOW MEDIUM REMOVAL
23	READ FORMAT CAPACITIES
25	READ CD/DVD CAPACITY
28	READ (10)
2A	WRITE (10)
2B	SEEK
2E	WRITE AND VERIFY (10)
2F	VERIFY (10)
35	FLUSH CACHE
37	READ DEFECT DATA
3B	WRITE BUFFER
3C	READ BUFFER
42	READ SUB-CHANNEL
43	READ TOC/PMA/ATIP
44	READ HEADER
45	PLAY AUDIO (10)
46	GET CONFIGURATION
47	PLAY AUDIO MSF
4A	GET EVENT/STATUS NOTIFICATION
4B	PAUSE/RESUME
4E	STOP PLAY/SCAN
55	MODE SELECT (10)
56	RESERVE (10)
57	RELEASE (10)

Code (Hex.)	Command
5A	MODE SENSE (10)
A2	SEND EVENT
A3	SEND KEY
A4	REPORT KEY
A5	PLAY AUDIO (12)
A7	SET READ AHEAD
A8	READ (12)
AA	WRITE (12)
AC	GET PERFORMANCE
AD	READ DVD STRUCTURE
AE	WRITE AND VERIFY (12)
AF	VERIFY (12)
B6	SET STREAMING
B9	READ CD MSF
BA	SCAN
BD	MECHANISM STATUS
BE	READ CD

14. Notes on data guarantee

14.1 Disappearance of data in buffer in a write cache operation

In a write cache operation, before data are actually written to a disc, a status response to the WRITE command or WRITE & VERIFY command is sent. If the power supply is switched off immediately after the status response, there is a possibility that the data in the buffer will disappear before being written to the disc. To avoid this problem, execute FLUSH CACHE command before switching off the power supply.

Always execute FLUSH CACHE command before switching off the power supply, to avoid any risk of disappearance of data in buffer.

14.2 Error report in a write cache operation

When an error which cannot be recovered before all the data is received and written in the buffer and a status response to the command is sent in the write cache operation, the error is reported as 71H in REQUEST SENSE DATA. This shows that the error occurred on the last WRITE command or WRITE & VERIFY command.

14.3 Automatic sector replacement at a write operation

When data can not be written to the disc normally due an unrecoverable error, such as ID NOT FOUND, the drive replaces the sector by sector replacement processing. The drive prevents data from being lost by this operation as much as possible. Because automatic sector replacement processing is executed after write retry ends in an error, a time of between 7 to 15 seconds is needed. Therefore, it is recommended that the time-out to the command generating access to the disc is set at 20 seconds or more. In a write cache operation, when automatic sector replacement processing is done after a status response to the command is send, execution of the following command can be made to wait. However, when the following command is a WRITE command or WRITE & VERIFY command, the first data transfer of one block is executed without waiting, to prevent a time-out of the host.

14.4 Verification of a block address

When the command is received, a drive calculates block addresses where the data are written or read, with the start address and length specified by the command, and verifies whether the block addresses contain a block address which does not exist. If such a block address exists is founded, the drive does not record nor read, and reports on the error to the command at once.

14.5 Error generation in Read Modify Write operation

If, in a WRITE command and WRITE & VERIFY command, a start address number is not other than *****0H or a block length is other than *16 x (integer)* though the start address number is *****0H, the drive reads all data in an ECC block which contain the specified address once, and replaces the data in the ECC block by the data of the specified address. This chain of operations is called "Read Modify Write Operation". In "Read Modify Write Operation", in WRITE command and WRITE&VERIFY command, an error occurs when the data of the ECC block cannot be read for some reasons.

Moreover, not only the data which tried to be recorded but also the data of other addresses in the same ECC block might be lost due to the failure to record.

15. MISCELLANEOUS

15.1 Accessories

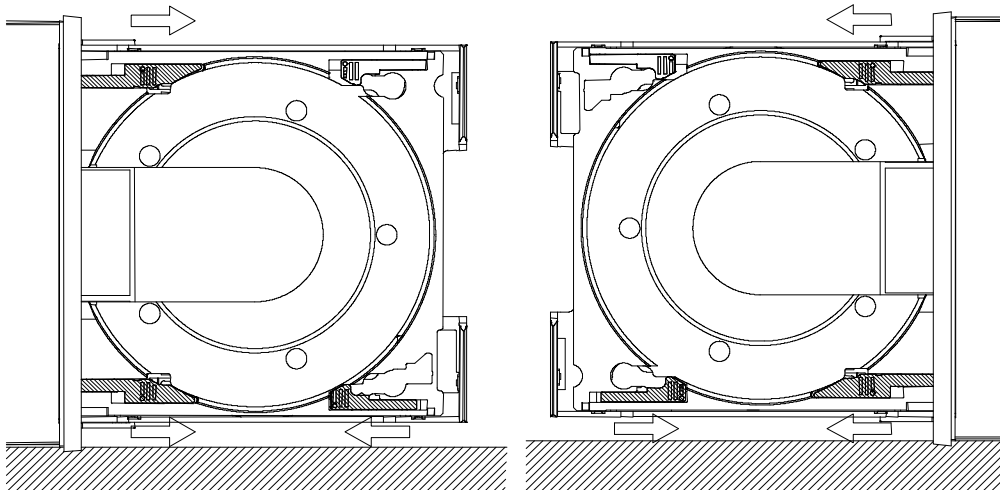
Function setting jumper pins	5 pieces.
Emergency eject tool	1 piece.

15.2 A bare disc setting at vertical installation

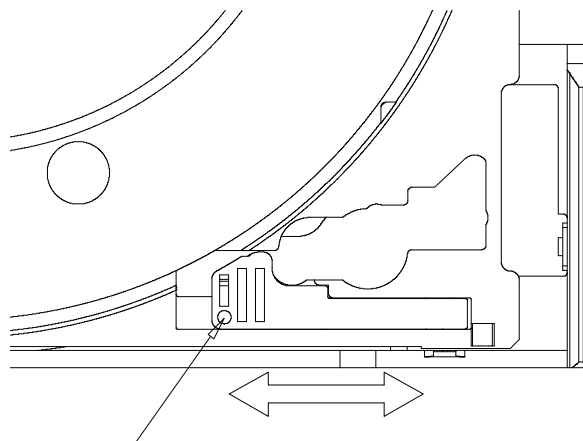
In case of using a bare disc (ex. DVD-ROM or CD-ROM) at vertical installation, use disc holders on the tray. Please read the following explanations thoroughly at this time.

1. Draw three disc holders among the four holders on the tray, two pieces are both holders in down side, one piece is on a rear part in upper side while made to vertical posture as follows.

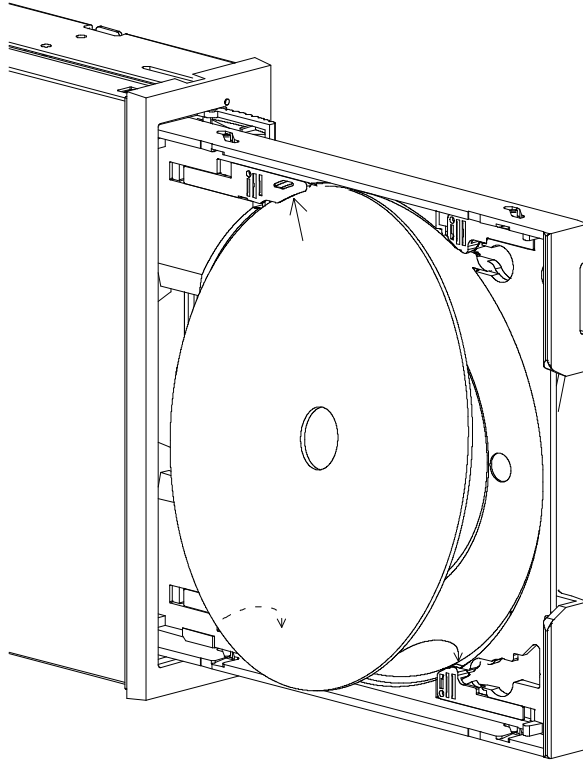
(Note) Please use 3 pieces holders because the set of the disc becomes difficult when four disc holders are drawn out.



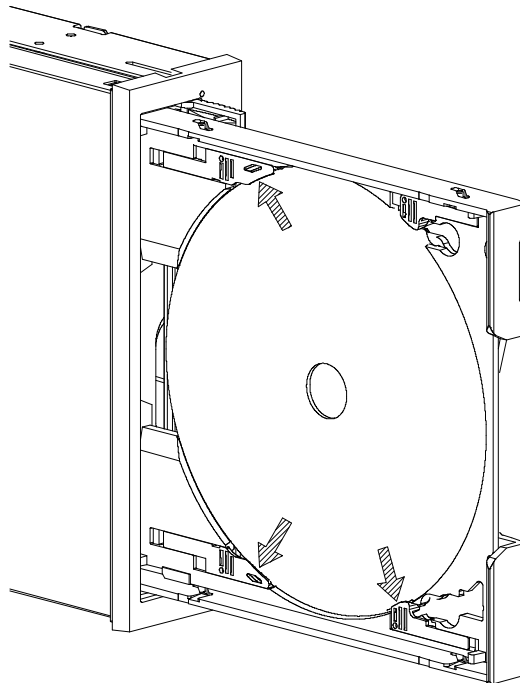
2. Drawing out a disc holder (pull return) can be easily done with inserting a propelling pencil ahead in the hole that is installed on the disc holder.



3. First hang a disc on a disc holder in an upper and rear side of a tray, and then put the disc on disc holders in a down side of the tray.



4. Check three disc holders to confirm to the disc surely.



Notes in use

- (1) A disc might be scratched, damaged and dropped from a tray when used with a disc not correctly installed. Please install correctly and use a disc.
- (2) Please do drawing out (pulling return) a disc holder before setting a disc in a tray.
- (3) Please do drawing out (pulling return) a disc holder with the power supply not supplied to the drive as much as possible, because the auto-loading function might work and the tray might enter the drive during drawing out or pulling return the disc holder.
When doing with the power supply to the drive unavoidably, work carefully holding the tray by hand firmly.
- (4) When using a drive by vertical posture, 80 mm DVD/CD cannot be used.
- (5) When DVD-RAM (cartridge type) is used, the position of a disc holder need not be returned.

15.3 Disc eject at emergency

Please do according to the following procedures when it is necessary to take out a disc from the drive in the emergency.

Check that the power supply of the drive is turned off and one minute or more passes.

Insert an attached emergency eject tool in the emergency eject hole and push bumping inside. (Figure 1)

Front bezel opens a little and an inside tray rises. (Figure 2)

When the tray comes out forward, draws out it and the disc is taken out. (Figure 3)

Please draw out the tray with an emergency eject tool, when the tray does not come out. (Figure 4)

Fig. 1

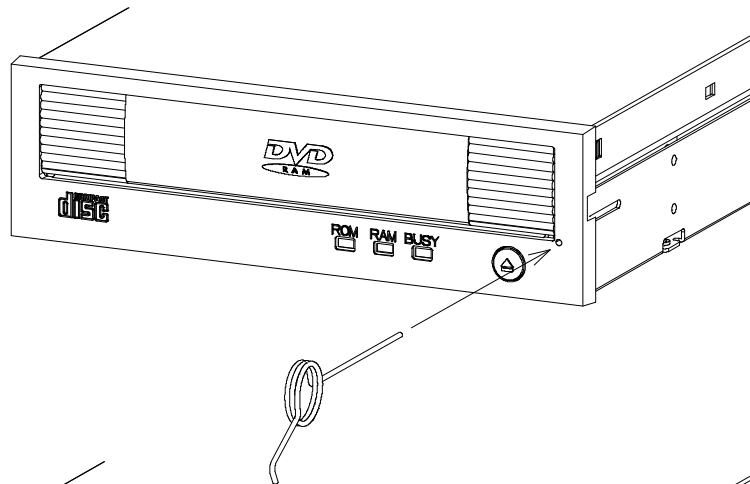


Fig. 2

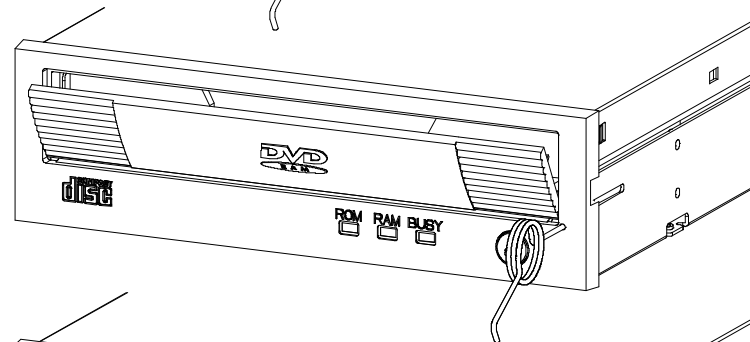


Fig. 3

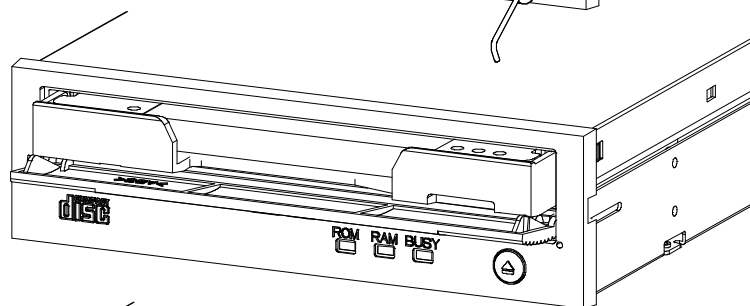
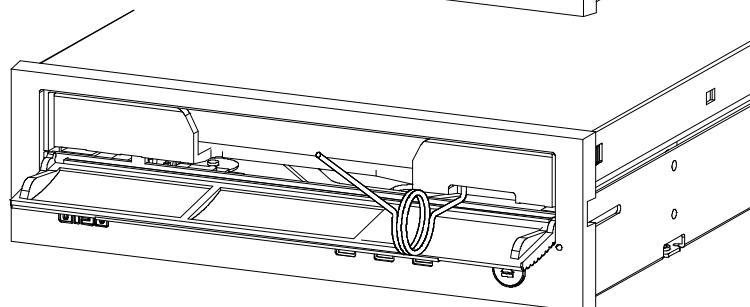


Fig. 4



Deviation List

Page	Item	Rev # 0.9a	Rev # 1.0
3	Cautions	---	Add (6)
8	Rotational speed(DVD-RAM)	1,130 - 2,640 rpm	1,028 – 2,400 rpm
	Host I/F	ANSI ~ Rev 10k	ANSI ~ Rev 10L
9	Average access time	150 ms (typ.)	170 ms (typ.)
12	8.3 vibration	9.8 cm/s ²	9.8 m/s ²
17	10.3 Notes on mounting	150 gf : 0.015N	1.5N : 150 gf
20	12 Rear View and Connectors	Audio ~ CD(3 pin)	Audio ~ CD(4 pin)
23	12.4 Audio Connector	Connector chart(3 pin) (0082 ~ Kyosera Elco	Connector chart(4 pin) part number ~ AMP
26	13.1 Applicable standard	ANSI ~ Rev 10k	ANSI ~ Rev 10L
32	Notes in use (4)	8 cm DVD/CD ~	80 mm DVD/CD ~